

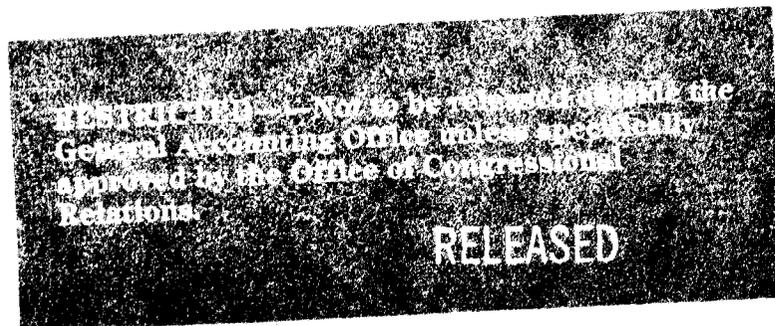
GAO

Report to the Chairmen, Subcommittees
on Defense, Senate and House Committees
on Appropriations

May 1989

ARMY AMMUNITION

Acquisition of the M762 Electronic Time Fuze and the XM900E1 Tank Round



**National Security and
International Affairs Division**

B-235416

May 31, 1989

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

As requested in the Conference Committee report on Department of Defense appropriations for fiscal year 1989 (House Report 100-1002, Sept. 28, 1988), we are reviewing selected aspects of the Army's programs for acquiring the XM900E1 105-millimeter tank round and the M762 electronic time fuze. Specifically, we are examining (1) the testing programs, test results, and the data supporting the type classification¹ of both items and (2) the cost and benefits of the electronic time fuze compared to those of the existing mechanical time fuzes. Although we have not completed our work, we have identified a few problems that suggest potential budget savings.

In March and April 1989, we discussed the status of our work with your offices. As requested by the House Committee on Appropriations, we are providing an interim report on our review covering testing problems with the XM900E1 tank round and differing cost estimates for the M762 electronic time fuze for use during your initial markup of the Defense Appropriations Bill.

Results in Brief

We found that (1) the Army's fiscal year 1990 budget request for procurement funds for the XM900E1 is premature because testing revealed problems in accuracy (requiring design changes) and in armor penetration, (2) while the M762 electronic time fuze has been type classified, the Army plans further testing because the fuze has detonated early in cloudy weather conditions, and (3) the final unit price for the electronic time fuze has not been determined because contract negotiations are not complete.

¹When an item is type classified it is identified as acceptable for its intended mission and for introduction into the inventory.

Background

XM900E1 105-mm Tank Round

The XM900E1 tank round, which is a product improvement to the currently used M833 tank round, is designed to increase the armor penetration and performance of the M1 and M60A3 tank guns.

The XM900E1 program modifies existing available technology and techniques to quickly improve the existing M833 round. Approval for low-rate initial production is to be based on development tests and a consolidated safety and verification test conducted by the Army's Test and Evaluation Command. These tests are currently in progress. In addition, the Ballistic Research Laboratory is testing XM900E1 rounds, under a classified program, to determine the round's armor penetration capability.

M762 Electronic Time Fuze

According to the Army, the M762 electronic time fuze was developed to fill the need for an accurate, reliable, mass-producible, and low cost electronic time fuze to use with current and developmental field artillery weapon systems. The Army wanted a fuze that could be easily set by hand—requiring no external setters or tools. It also wanted the fuze to have a remote set capability, the capability to be set automatically, thereby permitting the advanced artillery systems to achieve higher firing rates in shorter response times.

The electronic fuzes will be used with all existing and developmental projectiles in the 105-mm, 155-mm, and 8-inch artillery weapon systems. The electronic time fuzes, which use quartz crystals for their timing bases, replace the current mechanical fuzes, which use mechanical timing mechanisms. According to the Army, the use of the quartz crystal provides greater timing accuracy without an increase in cost; employment of the electronic fuzes will result in fewer setting errors than occur with the current mechanical fuzes; and the new fuzes can be more quickly and easily set. Army officials stated that the electronic fuze will become cost competitive with the existing mechanical fuzes when higher production rates are achieved and the electronic fuze producers have amortized their capital investments.

The XM900E1 Tank Round Has Not Been Type Classified

Last year, the Army's justification data in support of its fiscal year 1989 budget request showed December 1988 as the date that the Army expected to type classify the round for limited procurement. Since Army budget guidance requires type classification by the end of the first quarter of the fiscal year for which procurement funds are requested and since the Army planned to type classify the XM900E1 in the first quarter, it was appropriate for the Congress to provide the \$30.9 million in procurement funds for this new item.

The Army's most recent January 1989 justification data in support of its fiscal year 1990 budget request² showed that the planned type classification date had slipped to February 1989. However, as of May 1989, the XM900E1 had not been type classified because of unresolved technical problems. An accuracy problem, which has prevented the Army from finalizing the design, is one reason for the delay.

Developmental testing by the Army's Test and Evaluation Command has disclosed that the XM900E1 round has not met the target impact dispersion (accuracy) criteria contained in the Required Operational Capability document for the round. The Ballistic Research Laboratory has identified two problems that it believes are degrading the round's accuracy. The Army is working on design changes that it believes will enable the XM900E1 to meet the established accuracy requirement. Army officials told us that a final design cannot be completed until developmental testing has shown that the planned design changes have corrected the accuracy problem. The round is currently scheduled for type classification in December 1989.

There are also indications that the XM900E1 should be tested for penetration capability against targets other than those being used for the safety tests, details of which are classified. Although armor penetration tests have not been completed, the preliminary results of various tests firings indicated that the XM900E1 can meet the Army's armor penetration requirements. Ballistic Research Laboratory tests related to the XM900E1 indicated that the range targets used for developmental testing were not sufficient to demonstrate the round's ability to defeat the current threat; however, the Army is now testing the XM900E1 against a more "robust" target.

²The amount and quantity of the fiscal year 1990 budget request is classified.

Concerns About Electronic Time Fuze Testing and Cost Estimates

The M762 and M767³ electronic time fuzes, which were developed by Motorola, Incorporated, experienced a major problem during developmental testing in March 1988. The fuze detonated prematurely when fired during cloudy weather. The problem was corrected, and a limited number of modified fuzes were tested successfully in August 1988. Although the Army Materiel Systems Analysis Activity raised concerns about the limited number of fuzes that were tested to demonstrate that the problem had been resolved, the Army considered the testing as successful and type classified the fuze in September 1988. It stipulated, however, that further testing be conducted on the initial procurement quantity of electronic time fuzes to be procured in fiscal year 1989. The Army plans to test about 30 fuzes to confirm correction of the deficiency.

Our preliminary analysis of the Army's cost estimates for the electronic time fuzes showed lower unit prices than those used in the fiscal year 1990 budget request. The Army's fiscal year 1990 budget request of \$47.4 million for 417,000 M762 electronic time fuzes shows a \$106.46 unit price for the fuze. However, the Army's January 1989 comparative cost analysis shows a unit price of \$82.15, \$24.31 less than the Army's budget estimate. Likewise, the Army's fiscal year 1990 budget request of \$7.5 million for 61,000 M767 electronic time fuzes shows a \$111.77 unit price, whereas the January 1989 comparative cost analysis shows a unit price of \$87.88, \$23.89 less than the Army's budget estimate.

Fuze project office officials said that the lower unit prices contained in the January 1989 comparative cost analysis were the latest unit prices available for the M762 and M767 fuzes. If the Army's cost estimates in its January 1989 comparative cost analysis are correct, the Army's fiscal year 1990 budget requests for M762 and M767 electronic time fuzes are overstated—the request of \$47.4 million for M762 fuzes is overstated by \$10.1 million (\$24.31 times 417,000 units), and the \$7.5 million for M767 fuzes is overstated by \$1.4 million (\$23.89 times 61,000 units). However, the final unit price for the electronic time fuze has not been determined because contract negotiations are not complete.

Conclusions

According to Army budget guidance, the XM900E1 should have been type classified in the first quarter of fiscal year 1989 for the fiscal year 1989 program. However, unresolved technical problems with the XM900E1 round's accuracy have prevented the Army from completing

³The M767 is simply an M762 with added explosives used with certain artillery projectiles.

developmental testing and obtaining type classification approval. Because of this delay we believe that it is premature to provide additional procurement funds for the XM900E1 round for fiscal year 1990. Fiscal year 1989 procurement funds are available to meet fiscal year 1990 needs.

Although the M762 electronic time fuze has been type classified, there are some performance and cost concerns. The Army plans to test additional fuzes to confirm that a problem with premature detonation has been resolved, and is negotiating the price of the fuzes as part of the 1989 production contracts.

Agency Comments

As requested, we did not obtain agency comments on this report; however, we discussed our preliminary results with Army officials and included their comments where appropriate.

Objectives, Scope, and Methodology

Our objectives are to examine (1) the testing programs, test results, and the data supporting the type classification of the XM900E1 tank round and the M762 electronic time fuze and (2) the cost and benefits of the electronic time fuze as compared to those of the existing mechanical time fuze.

In conducting our review of the costs and benefits of the M762 electronic time fuze, we are examining (1) the Army's current and projected cost estimates for the electronic and mechanical fuzes, (2) the Army's life-cycle cost estimates for the electronic fuze to determine if and when it will reach cost comparability with the mechanical fuze, (3) the Army's data on the capabilities and performance of the electronic and mechanical fuzes to determine the benefits of the electronic fuze, (4) the Army's data on the autoseal capability of the electronic fuze and the Army's schedule for modifying or developing weapons that will use the autoseal capability, and (5) the test incident reports and other data on the electronic and mechanical fuzes to identify problems and corrective actions.

In conducting our review of the XM900E1 tank round, we are examining the results of tests of the XM900E1 round and the Army's actions and plans to redesign the round to address problems with accuracy and armor penetration disclosed during developmental testing.

We performed our work from January to March 1989 in accordance with generally accepted government auditing standards.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report for 30 days. At that time we will send copies to the Secretaries of Defense and the Army; the Director, Office of Management and Budget; and other interested parties.

GAO staff members who made major contributions to this report were Raymond Dunham, Assistant Director, Army Issues; Noble Holmes, Evaluator-in-Charge, Army Issues; Leo Schilling, Site Senior, Philadelphia Regional Office; and Alonzo Echols, Evaluator, Philadelphia Regional Office. Please contact me at (202) 275-4141 if you or your staff have any questions concerning this report.



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